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*Carol Garmon*

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re PATENT APPLICATION of Hall et al :  
:   
Serial No. 09/811,101 : Art Unit 2827  
:   
Filed: March 16, 2001 : Examiner Dinh  
:   
Title: **MULTI-LAYERED HIGH DENSITY** : Confirmation No. 8303  
**CONNECTIONS** :  
:

Atty. Docket No. END920000087US1 (IEN-10-5540)

**TRANSMITTAL OF APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

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AND RECORDS

Dear Sir:

1. Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on May 13, 2003 .

Note: "The applicant shall, within 2 months from the date of the notice of appeal under § 1.191 in an application, reissue application, or patent under reexamination, or within the time allowed for response to the action appealed from, if such time is later, file a brief in triplicate." 37 CFR 1.192(a) [emphasis added].

2. **STATUS OF APPLICATION**

This application is on behalf of

- ☒ other than a small entity  
☐ small entity

Verified statement:

- ☐ attached  
☐ already filed

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3. **FEE FOR FILING APPEAL BRIEF**

Pursuant to 37 CFR 1.17(f) the fee for filing the Appeal Brief is:

- ☐ small entity \$ 160.00  
☒ other than small entity \$ 320.00

**Appeal Brief fee due: \$320.00**

4. **EXTENSION OF TERM**

*Note: The time periods set forth in 37 CFR 1.192(a) are subject to the provision of § 1.136 for patent application. 37 CFR 1.191(d). Also see Notice of November 5, 1985 (1060 O.G. 27).*

The proceedings herein are for a patent application and the provisions of 27 CFR 1.136 apply.

(complete (a) or (b) as applicable)

- ☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

	Extension Months	Fee for other than small entity	Fee for small entity
<input type="checkbox"/>	one month	\$110.00	\$55.00
<input type="checkbox"/>	two months	\$400.00	\$200.00
<input type="checkbox"/>	three months	\$920.00	\$460.00
<input type="checkbox"/>	four months	\$1,440.00	\$720.00
<b>Fee:</b>			

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

- ☐ An extension for \_\_\_\_\_ months has already been secured and the fee paid therefor of \$\_\_\_\_\_ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request \$\_\_\_\_\_

or

- ☒ (b) Applicant believes that no extension of term is required. However, this

conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. **TOTAL FEE DUE**

The total fee due is:

Appeal Brief fee	\$320.00
Extension fee (if any)	\$ 0.00

**TOTAL FEE DUE: \$320.00**

6. **FEE PAYMENT**

- ☐ Attached is a check in the sum of \$ \_\_\_\_\_
- ☒ Charge **Account No. 09-0457** in the sum of **\$320.00**. A duplicate of this transmittal is attached.

7. **FEE DEFICIENCY**

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. if the maximum, six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, 1065 O.G. 31-33.

- ☒ If any additional extension and/or fee is required, this is a request therefor and to charge **Account No. 09-0457**.

AND/OR

- ☒ If any additional fee for claims is required, charge **Account No. 09-0457**.

Respectfully submitted,

Date: July 9, 2003

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Attachment

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re PATENT APPLICATION of Hall et al	:	
	:	
Serial No. 09/811,101	:	Art Unit 2827
	:	
Filed: March 16, 2001	:	Examiner Dinh
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Title: <b>MULTI-LAYERED HIGH DENSITY CONNECTIONS</b>	:	Conf. No. 8303
	:	

Atty. Docket No. END920000087US1 (IEN-10-5540)

**APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

**I. REAL PARTY IN INTEREST**

The real party in interest in the above-entitled application is the employer of the inventors, International Business Machine Corporation (hereinafter referred to as "appellant").

**II. RELATED APPEALS AND INTERFERENCES**

The undersigned attorney is not aware of any related appeals or interferences which will directly affect or be directly affected by, or have a bearing on, the Board's decision in this pending appeal.

**III. STATUS OF THE CLAIMS**

Claims 1-28 are pending in the application. Claims 5-7 and 11-26 are withdrawn from consideration. Claims 1 -4, 8-10, 27 and 28 have been acted upon

by the examiner and have been finally rejected. They are the subject of this appeal.

#### **IV. STATUS OF AMENDMENTS**

A proposed amendment after final rejection was filed in the U.S. Patent Office on March 7, 2003 by facsimile transmission. Initially, this amendment was not entered by the Examiner per an office action dated April 15, 2003. After a telephone interview between the attorney for appellant and the examiner, the amendment was entered in an office action dated May 6, 2003, solely for the purpose of appeal.

#### **V. SUMMARY OF THE INVENTION**

The invention covered by the claims on appeal relates to a laminate comprising a printed circuit (pc) board or a sub-assembly of a pc board. (page 6, lines 15-16 of the specification). The laminate has two generally flat planar surfaces separated by one or more side edges (page 6, lines 18-20). One or more circuit lines are embedded in the laminate and terminate at one edge to form connection points (page 6, lines 17 and 20-21). Each connection point can be coupled to an active or passive device, such as a circuitized ceramic module, a semiconductor chip, a diode, a resistor, a capacitor or the like (page 6, line 22, to page 7, line 2). Figure 2 shows circuit lines 16a, 16b terminating along an edge 18b at a contact pad 44 which can be joined through solder balls 40 or other such connector to an active or passive device, such as a chip 42. The circuit line 16a is connected to a plated through hole 46 and circuit line 16b is connected to a via 30. The via and the plated through hole both terminate at the

top surface 48 where they are available to be connected to additional active or passive devices. This creates a 3-dimensional grid of connection points to electrically couple the active or passive surface mounted devices to edge mounted devices.

Figure 4 shows one embodiment of the invention as covered by the claims on appeal. This structure can be used to rapidly transmit data, such as optical data that is received from a spectroscope through a VCSEL laser and the electronic structure to a computer for diagnostics and analysis. To create more space on the edge 20 of the core 10, the edge is beveled at an angle of less than 90°, e.g. between 30° and 60°. In like manner, the wafer 50 is mounted to the coupler 52 at the same angle. One edge 20 of the stacked laminate is sheared to expose a large number of edge connection points (not shown) optically engaging the individual light sources emanating from the laser wafer 50. (page 10, lines 22-25)

## **VI. ISSUES**

The sole issue on appeal is whether the appealed claims are unpatentable as being obvious under 35 U.S.C. 103(a) over a Beilstein, Jr. patent (reference cited by the appellant) in view of Solomon patent, U.S. 4,992,908.

## **VII. GROUPING OF THE CLAIMS**

For the purposes of this appeal, all of the claims will be grouped together. They will be represented by claim 1.

## VIII. ARGUMENTS

In the discussion that follows, appellant has first set out in italics and single spaced, the specific rejections that were made by the Examiner in the final office action, followed by a concise explanation as to why the rejection should be withdrawn.

**Claims 1-4, 8-10, and 27-28 are rejected under 35 U.S. C. 103(a) as being unpatentable over Beilstein, Jr. (reference cited by appellant) in view of Solomon (U. S. Patent 4,992,908).**

**As to claims 1 and 27, Beilstein discloses an electronic sub assembly (30-figure 2, column 4, line 22) as shown in figures 2-5 comprising**

**a circuitized laminated substrate (module 32, column 4, line 23) having top and bottom surfaces (19, 17-figure 2, column 4, line 29), and at least one edge surface (21; 33, column 4, line 29, and column 6, line 37) between said top and bottom surfaces,**

**at least one active or passive device (52; 70, column 5, line 10) mounted on said at least one edge surface, at least one another active or passive devices (42, 38-figure 2) mounted on at least one of the top and bottom surfaces (19, 17),**

**a conductive lead (37-figure 3) embedded in the substrate (32) electrically connected to another active or passive device (70-figure 3) mounted on said at least one edge surface (33-figure 3), the conductive lead also electrically connected to the at least one device on the top or bottom surface.**

**Beilstein does not disclose the edge surface between the top and bottom surfaces, which is beveled, at an angle between 30-60 degrees.**

**Solomon teaches a contact board (13, column 3, line 39) having a beveled edge (17, column 3, line 40) between top and bottom surfaces disclosed in figures 1-15.**

**It would have been obvious to one having ordinary skill in the art at the time the invention was made to have substrate including beveled edge at an angle of 30-60 degrees between top and bottom surfaces as taught by Solomon to employ the electronic sub-assembly of Beilstein in order to provide facilitate precisely mating contact of module to module and also save space for the design.**

As acknowledged by the examiner, claim 1 is distinguished from the structure of Beilstein, Jr., U.S. Patent 5,426,566, in that the edge surface of the claimed sub assembly is beveled (i.e. not at right angles) to the planar surfaces. This feature yields a significant increase in the amount of edge surface area that is available for contact with active or passive devices or with other sub assemblies.

Nowhere does Beilstein disclose or even suggest a conductive lead "...electrically connected to at least one device on the top or bottom surfaces..." (lines 6 and 7 of appellant's claim 1). The conductive lead 37 that the examiner highlights is no more than a connect pad in the form of a solder bump (Beilstein, column 6, lines 35-36) that is on the end surface of the laminate, not "embedded in the substrate..." as specified in appellant's claim 1.

Appellant respectfully submits that the lack of specificity in the Beilstein patent is not overcome by the teachings of Solomon. This patent describes the joining together of an integrated circuit orthogonally to a contact board. These two components are joined along an angular surface that is defined by the orientation of the crystal lattice of the silicon from which the contact pad is fabricated. The angle is achieved by anisotropically etching the contact board at a specified angle of 54° as determined by the microcrystalline lattice structure of the silicon.

Also, of significance in Solomon is that the top and bottom edges of the integrated circuit are not shown as having any electrical connection to the edges of the circuit. Thus, neither he nor Beilstein shows this feature of appellant's claim 1 of

***"..., a conductive lead embedded in the substrate electrically connected to an active or passive device mounted on said at least one edge surface, the conductive lead also electrically connected to at least one device on the top or bottom surface."***

Appellant respectfully submits that there must be a reasonable predictability in the prior art applied by the examiner in the rejection of the claims.



In the case of In re Vaeck, 9 F.3d 1533, 28 USPQ2d 1956 (Fed. Cir. 1991), the court stated

“Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under §103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success.... Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicants' disclosure.”

Appellant respectfully submits that the combined teachings of these two patents do not meet this dual criteria, therefore, leading to the inescapable conclusion that the invention, as now claimed in claim 1, is obvious.

To hold otherwise is to engage in the practice of hindsight analysis, a practice that is disallowed by decisions such as W. L. Gore & Associates, Inc. v Garlock, Inc., 220 USPQ 303, 312-313 (Fed. Cir 1983), which states at pages 312-313 as follows:

“To imbue one of ordinary skill in the art with knowledge of the invention...when no prior art reference or references of record convey or suggest that knowledge is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.”

The recent decision of In re Sang Su Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002) observed that:

“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references, quoting from *In re Dance*, 160 F.3d 1339, 1343 48 USPQ2d 1635, 1637 (Fed. Cir. 1998)”

Appellant respectfully submits that this requirement has not been met in the combined teachings of Beilstein and Solomon.

Furthermore, there must be some suggestion in the references leading to a modification that would point to the claimed invention. The court goes on to say, quoting from In re Fine, 837 F. 2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed Cir. 1988)

...there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the appellant." (emphasis added by Appellant)

Again, that suggestion or modification does not appear in the references applied by the examiner in the final rejection from which this appeal is taken. Solomon does not provide any suggestion whatsoever that the use of a beveled edge of a laminated circuit board would allow for the higher density of active or passive devices to be joined to the edge of a sub assembly. Beilstein does not teach the coupling of these edge-joined devices to surface mounted devices by circuitry embedded in the sub-assembly. Without such a teaching in either reference, the rejection for obviousness lacks a supportable basis and should be withdrawn. It is not enough that one may modify a reference in view of the second reference, but rather it is required that the second reference suggest modification of the first reference. It must do more than merely provide the capability of modifying the first reference.

The law is quite clear that, in order for a claimed invention to be rejected on obviousness, the prior art must suggest the modifications sought to be patented; In re Gordon, 221 U.S.P.Q. 1125, 1127 (CAFC 1984); ACS Hospital System, Inc. v.

Montefiore Hospital, 221 U.S.P.Q. 929, 933 (CAFC 1984). The foregoing principle of law has been followed in Aqua-Aerobic Systems, Inc. v. Richards of Rockford, Inc., 1 U.S.P.Q. 2d, 1945 (D.C. Illinois 1986). In the Aqua-Aerobic's case, the Court stated that the fact that a prior reference can be modified to show the claimed invention does not make the modification obvious unless the prior reference suggests the desirability of the modification. The CAFC in the case of In re Gorman, 18 U.S.P.Q.<sup>2d</sup> (CAFC 1991), held at page 1888:

"When it is necessary to select elements of various teachings in order to form the claimed invention, we ascertain whether there is any suggestion or motivation in the prior art to make the selection made by the appellant [citation omitted]. 'Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination [citations omitted]. . . . The references themselves must provide some teaching whereby the appellant's combination would have been obvious."

Further, the CAFC, in In Re Oetiker, 24 U.S.P.Q.<sup>2nd</sup> 1443, 1445 (CAFC 1992) held:

There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from the appellant's invention itself.

More significantly, the CAFC in the case of In Re Dembiczak, 50 U.S.P.Q.<sup>2nd</sup> 1614 (CAFC 1999), held at 1617:

...(examiner can satisfy burden of obviousness in light of combination 'only by showing some objective teaching [leading to the combination]');

Thus, it is clear that where an individual reference does not teach the entire invention, then the modification which the invention represents must be suggested

and motivated by some other reference through some objective teaching and cannot come from the application itself. Appellant respectfully submits that these requirements have not been met by the examiner in his rejection of claim 1.

When considering an obviousness rejection, the following principles of patent law must be adhered to:

- (a) The claimed invention must be considered as a whole;
- (b) The references must be considered as a whole and must suggest the desirability and, thus, the obviousness of making the combination;
- (c) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention, and
- (d) Reasonable expectation of success is the standard with which obviousness is determined. (See MPEP 2141 and Hoods v. Block Drug Co., 786 F.2d, 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986)

Furthermore, as stated in In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998):

“...particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention would have selected these components for combination in the manner claimed”

Notwithstanding the collective arguments made by the Examiner regarding the alleged obviousness of claim 1, Appellant has clearly articulated *supra* highly compelling reasons that the invention as presented in this independent claim is unobvious and, thus, patentable. Accordingly, the final rejection of this claim should be reversed.

## SUMMARY

The claims on appeal clearly set forth that the invention of the appellant is a sub assembly and a printed circuit board that are configured with at least one beveled edge surface between the top and bottom surfaces of a substrate. At least one active or passive device on the beveled surface is electrically coupled to at least one other device on the top or bottom surfaces. The prior art patents to Beilstein, Jr. et al and Solomon do not relate to such a structure. Appellant respectfully submits that the Examiner has improperly read these references with a generous dose of hindsight, concluding that the claimed invention is obvious under 35 USC. §103(a).

In view of the above, it is believed that claim 1, and with it, the remaining claims on appeal are distinguishable and unobvious over the cited and applied prior art references. It is believed that the reasons for allowability have been clearly and succinctly set forth in the arguments above. Therefore, it is requested that this Board set aside the final rejection and remand the application to the examiner.

Respectfully submitted,

Date:

July 9, 2003

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Attachments

# APPENDIX

## CLAIMS

1. (Previously Amended) An electronic sub assembly comprising a circuitized laminated substrate having top and bottom surfaces, and at least one beveled edge surface between said top and bottom surfaces, at least one active or passive device mounted on said at least one edge surface, at least one other active or passive device mounted on at least one of the top and bottom surfaces, a conductive lead embedded in the substrate electrically connected to the active or passive device mounted on said at least one edge surface, the conductive lead also electrically connected to the at least one device on the top or bottom surface.

2. (Original) The sub assembly according to claim 1 wherein each of the active or passive devices is selected from the group including chips, diodes, resistors, capacitors and printed wiring boards.

3. (Original) The sub assembly according to claim 1 further including an electrically conductive via extending into the substrate from each device on the top or bottom surface into contact with a conductive lead connected to an edge mounted device.

4. (Original) The sub assembly according to claim 1 wherein the laminated substrate is selected from the group comprising a single or multiple

laminates of a fiberglass reinforced prepreg and a conductive layer, and a single or multiple laminates of a ceramic module and a conductive layer.

Claims 5-7                      (Withdrawn)

8.        (Previously amended)        A printed circuit board having two spaced apart, generally parallel surfaces comprising a top surface and a bottom surface, a beveled edge surface between said top and bottom surfaces, a plurality of conductive leads embedded in the circuit board parallel to the top and bottom surfaces and terminating in one or more connection points along the beveled edge surface, an active or passive device mounted on said edge surface and electrically joined through at least one of said connection points to at least one of the conductive leads, and at least one other active or passive device mounted on the top or bottom surface electrically joined through one of said conductive leads to the edge mounted device.

9.        (Original)        The printed circuit board according to claim 8 further including a via on the top or bottom surface, and coupled to a top or bottom mounted device, said via extending into the substrate into contact with a conductive lead connected to said edge mounted device.

10. (Original) The printed circuit board according to claim 8 wherein each active or passive device is selected from the group including chips, diodes, resistors, capacitors and printed wiring boards.

Claims 11-26 (Withdrawn)

27. (Previously added) The electronic sub assembly according to claim 1 wherein the edge surface is beveled at an angle of between 30° and 60° with respect to the top or bottom surface.

28. (Previously added) The printed circuit board according to claim 8 wherein the edge surface is beveled at an angle of between 30° and 60° with respect to the top or bottom surface.



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